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KSTAR Tokamak Visible Image sequence classification with Long-term Recurrent Convolutional Networks

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This paper represents the tokamak in-vessel image sequence classification method that used to automatically infer plasma status. Fast framing standard CCD cameras are installed on KSTAR (Korea Superconducting Tokamak Advanced Research) to monitor plasma shape, plasma motion and plasma status. The images generated by the CCD cameras were used for plasma start-up studies and plasma disruption studies. In KSTAR, the images generated by the CCD camera are visually confirmed after the experiment or analyzed manually by the researcher. We introduced long-term recurrent convolutional networks to automatically infer the plasma status from the image. To obtain the description about the image from cameras, we applied Convolutional neural networks(CNNs). To learn a description of image sequences, description from CNN are used as input to Long Short-Term Memory(LSTM) modules. By applying LSTM, we can learn temporal information from variable-length input image sequence. Our results show this model can effectively learn tokamak in-vessel image sequence and infer status of plasma.

Co-authors: Dr KWON, Giil (Control Team, National Fusion Research Institute); Dr WI, Hanmin (Plasma Diagnostics, National Fusion Research Institute); Dr HONG, Jasic (Control Team, National Fusion Research Institute)

Presenter: Dr KWON, Giil (Control Team, National Fusion Research Institute)

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